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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/584,796	06/01/2000	Fredrik Lindqvist	1410-679	4990

7590 10/20/2004

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EXAMINER	
JAMAL, ALEXANDER	
ART UNIT	**PAPER NUMBER**
2643	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Advisory Action	Application No.	Applicant(s)
	09/584,796	LINDQVIST ET AL.
	Examiner	Art Unit
	Alexander Jamal	2643

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 25 August 2004 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

PERIOD FOR REPLY [check either a) or b)]

a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection. ONLY CHECK THIS BOX WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1. ☐ A Notice of Appeal was filed on _____. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37 CFR 1.191(d)), to avoid dismissal of the appeal.

2. ☐ The proposed amendment(s) will not be entered because:

   (a) ☐ they raise new issues that would require further consideration and/or search (see NOTE below);

   (b) ☐ they raise the issue of new matter (see Note below);

   (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

   (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____.

3. ☐ Applicant's reply has overcome the following rejection(s): _____.

4. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

5. ☐ The a)☐ affidavit, b)☐ exhibit, or c)☐ request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.

6. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.

7. ☒ For purposes of Appeal, the proposed amendment(s) a)☐ will not be entered or b)☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

   The status of the claim(s) is (or will be) as follows:

   Claim(s) allowed: _____.

   Claim(s) objected to: _____.

   Claim(s) rejected: *1,3-7,9-44*.

   Claim(s) withdrawn from consideration: _____.

8. ☐ The drawing correction filed on _____ is a)☐ approved or b)☐ disapproved by the Examiner.

9. ☐ Note the attached Information Disclosure Statement(s)(PTO-1449) Paper No(s). _____.

10. ☒ Other: *Examiners reply to arguments enclosed*

DUC NGUYEN
PRIMARY EXAMINER

DETAILED ACTION

Response to Amendment

1. Based upon the submitted amendments filed 8-25-2004 examiner withdraws the 35 USC 112 rejection to claim 10.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claim 29** rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The domain of the received signal is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Claim 29 depends from claim 20, and claim 20 specifies a 'transceiver canceling an echo from received signal in the **frequency** domain...'. Claim 29 states canceling the echo from the received signal in the time domain. The specification does not disclose a single embodiment of the invention that cancels an echo estimate from the received signal in both the time and frequency domains.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1,3-7,9-17,20-43,** rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al. (5317596), and further in view of Dowling (6597745).

As per **claim 1,** Ho discloses an echo canceller used in a transceiver (ABSTRACT). The device comprises electronic circuitry configured to estimate and remove echo signals in the frequency domain (Fig. 3 Col 5 line 65 to Col 6 line 22). However, Ho does not disclose that the echo signals are estimated with a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol.

Dowling teaches an adaptive precoder that enables a block oriented receiver to recover a datastream in the presence of ISI and noise (ABSTRACT) that will reduce computational complexity over previous implementations (Col 2 lines 40-55). He further suggests that the precoder may be implemented in (merged with) an echo canceller (Col 22 lines 1-17). The precoder detects and compensates for noise (and ISI) in the signal using a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol (Fig. 5 Col 17 lines23-65). It would have been obvious to one of ordinary skill in the art at the time of this application to implement the precoder's functionality with Ho's echo canceller to

produce an echo signal (in the frequency domain) for the advantage that the precoder (and as such, the echo canceller) takes into account ISI and ICI (noise) and provides reduced computational complexity.

As per **claims 12,24,37,38,** claims rejected for same reasons as claim 1. Additionally, Dowling discloses that the input signal vector may be multiplied with a column vector (Col 9 lines 15-55).

As per **claims 20,30,35,** claims rejected for same reasons as rejection of claim 1. Additionally, Dowling discloses that the precoder takes into account the effects of ICI (Col 8 lines 60-67).

As per **claims 3,13,26,32,43,** Dowling discloses that the input vector (and as such, the delayed vector) is hermitian-symmetric and is divided into real and imaginary parts (the imaginary parts are ignored) before matrix processing (Col 9 line 15 to Col 10 line 5).

As per **claims 4,5,22,31,** the first matrix (DOWLING: Figs 3,5) has coefficients that represent how an echo from a currently transmitted signal affects a received signal, and the second Matrix (DOWLING: Figs 4,5) represents how an echo from a previously transmitted signal affects the received signal.

As per **claims 6,7,34,36,** Ho discloses that the circuitry adapts the echo canceller coefficients (coefficients of the matrices) using a difference between the receive signal and the echo estimate signal using an lms algorithm (device 58, Fig. 3, Col 6 lines 50-62).

As per **claim 9,** Dowling discloses that the device may be implemented in a DMT transceiver (ABSTRACT).

As per **claim 10,** Dowling discloses that the Matrices may be NxN matrices (Col 7 lines 30-50).

As per **claims 11,33,42,** Dowling discloses that the device will function for a vector communication signal (which inherently includes, by definition, the transmit, receive, and echo estimate signals) such as a DMT system with Hermitian symmetric signal points (Col 2 lines 58-67).

As per **claims 14,15,23,** Dowling discloses a compensation (twiddle) factor (applied to both matrices) to compensate the previously transmitted signal that is a complex exponential term (Col 11 line 53 to Col 12 line 25, Col 14 lines 5-15). The twiddle factor is also applied to the triangular submatrix formed to compensate for a cyclic prefix (Col 20 lines 49-60). Dowling also discloses the device is used in a DMT type transceiver (ABSTRACT).

As per **claims 16, 17,27,28,40,41,** Ho discloses that for applications involving asymmetric data, the signal should be decimated or interpolated as appropriate (Col 7 lines 49-62).

As per **claim 21,** claim rejected for same reasons as rejections of claims 1 and 9.

As per **claim 25,39,** the matrix is combined with a difference between the current transmit signal and the product of the delayed signal (previously transmitted) and the compensating factor in the matrix (as per rejection of claim 14) (DOWLING: Fig. 5).

6. **Claims 18,19** rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al. (5117418), and further in view of Dowling (6597745).

As per **claim 18,** Chaffee discloses an echo canceller used in a transceiver (ABSTRACT). The device comprises electronic circuitry configured to estimate echo signals in the frequency domain, convert the estimate to the time-domain, then subtract the estimate in the time domain (Col 3 line 5 to Col 4 line 10). However, Chaffee does not disclose that the echo signals are estimated with a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol.

Dowling teaches an adaptive precoder that enables a block oriented receiver to recover a datastream in the presence of ISI and noise (ABSTRACT) that will reduce computational complexity over previous implementations (Col 2 lines 40-55). He further suggests that the precoder may be implemented in (merged with) an echo canceller (Col 22 lines 1-17). The precoder detects and compensates for noise (and ISI) in the signal using a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol (Fig. 5 Col 17 lines23-65). It would have been obvious to one of ordinary skill in the art at the time of this

application to implement the precoder's functionality with Chaffee's echo canceller to produce an echo signal (in the frequency domain) for the advantage that the precoder (and as such, the echo canceller) takes into account ISI and ICI (noise) and provides reduced computational complexity.

As per **claim 19,** claim rejected for same reasons as rejection of claim 18. Additionally, Dowling discloses that the input signal vector may be multiplied with a vector (Col 9 lines 31-55).

7. **Claim 44** rejected under 35 U.S.C. 103(a) as being unpatentable over Chaffee et al. (5117418) as applied to claim 35, and further in view of Dowling (6597745).

As per **claim 44,** Chaffee discloses an echo canceller used in a transceiver (method of reducing an echo) (ABSTRACT). The device comprises electronic circuitry configured to estimate echo signals in the frequency domain, convert the estimate to the time-domain, then subtract the estimate in the time domain (Col 3 line 5 to Col 4 line 10). However, Chaffee does not disclose that the echo signals are estimated with a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol.

Dowling teaches an adaptive precoder that enables a block oriented receiver to recover a datastream in the presence of ISI and noise (ABSTRACT) that will reduce computational complexity over previous implementations (Col 2 lines 40-55). He further suggests that the precoder may be implemented in (merged with) an echo canceller (Col

22 lines 1-17). The precoder detects and compensates for noise (and ISI) in the signal using a combination of both a product of a first matrix and transmitted symbol and a product of a second matrix and a previously transmitted symbol (Fig. 5 Col 17 lines23-65). It would have been obvious to one of ordinary skill in the art at the time of this application to implement the precoder's functionality with Chaffee's echo canceller to produce an echo signal (in the frequency domain) for the advantage that the precoder (and as such, the echo canceller) takes into account ISI and ICI (noise) and provides reduced computational complexity.

Response to Arguments

8. Applicant's arguments filed 8-25-2004 have been fully considered but they are not persuasive.

As per applicant's arguments on the finality of the office action ('Remarks' page 10), claims 20 and 30 were amended based upon an amendment received 3-2-2004. The scope of those claims was changed, and the examiner applied new rejections to those claims and all depending claims (claims 29,31-34).

As per applicant's arguments concerning the 112 first paragraph rejection of claim 29, applicant states that claim 29 has been cancelled but on the 'Listing of Claims' received with the amendment, claim 29 has not been cancelled. Furthermore, although applicant's specification states that the asynchronous echo canceller may be combined

with any other embodiments, the applicant's specification fails to specify how two echo cancellers would be combined such that they are canceling echo in both the time and frequency domain.

As per applicant's arguments regarding the 103 rejection of claims 1,3-7,9-17,20-43, the Dowling reference is used to teach a method of coding/decoding signals to take into account ISI and ICI. Dowling (Col 22 lines 1-3) states that the pre-coder can be used with echo cancellers. When the Ho and Dowling references are combined, the echo canceller of Ho will estimate and remove echoes based upon the signal received on the transmission line. This signal will be the coded signal taught by Dowling. The combined Ho-Dowling device will have an echo canceller that uses the received coded signal (that is based upon the product of matrices of transmitted signals) to generate echo canceling signals. The combination of Ho and Dowling does read on the claims as written.

As per applicant's argument regarding the 103 rejection of claims 18 and 19, again, the Dowling reference is used to teach the use of precoded signals in systems that may include echo cancellers. When combined with the echo canceller taught by Chaffee, the echo canceller will use the received coded signal (that is based upon the product of matrices of transmitted signals) to generate echo canceling signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 703-305-3433. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 703-305-4708. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9315 for After Final communications.

DUC NGUYEN
PRIMARY EXAMINER

AJ
October 14, 2004